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NOTES AND LITERATURE

EXPERIMENTAL EVOLUTION

The Effect of the Environment upon Animals.—The second volume of Bachmetjew's great work, "Experimentelle Entomologische Studien" (1), will be welcomed by all who are interested in the effect of external factors upon organisms. It will doubtless surprise many that, although dealing almost exclusively with insects, the author reviews more than 1,200 papers. Even so, seasonal dimorphism, protective coloration mimicry and parthenogenesis are only touched upon incidentally as it is intended to take them up in a later volume. Furthermore, practically none of the literature since 1905 is included. The first 600 pages of the book are taken up with short abstracts arranged in chronological order within appropriate groupings. These abstracts are then rearranged—often being repeated verbatim—in the "theoretical part" according to their bearing upon special problems. Although the author states his opinions concerning the significance of the data thus brought together, the reader is largely left to draw his own deductions, as it seems to have been the aim of the author to make a handbook to the literature of experimental entomology rather than a dissertation in support of his own views. There can be little room for doubt in view of this immense amount of evidence that environmental factors are responsible for many—perhaps most—of the variations and aberrations among insects. However, there is, as yet, little proof that they produce heritable modifications such as we believe real species to be made of. In this regard Tower's work with Leptinotarsa is a remarkable exception. Practically all the results so far obtained, while interesting and important, belong to physiology rather than to evolution.

Federly is continuing his work concerning the effect of external conditions upon the scales of Lepidoptera. A recent paper (2) reviews the literature of albinism and gives certain original observations. True albinism seems to be rare. However, cases of "pseudo-albinism," due to a reduction in the size of the scales but not in the intensity of the pigment nor in the number of pigment-bearing scales, are fairly common. This condition probably arises through an inhibiting action of the environment upon the ''scale mother cells.''

An interesting case of an environmental effect which is not easily reversed is given by Marchal (3). *Lecanium corni,* a scale insect, becomes *L. robiniarum* when reared upon *Robinia pseudo-acacia* instead of its normal food plants, but the reverse experiment does not succeed.

Salamanders are a close second to insects as favorite material for the experimental study of the effects of the environment. Powers has contributed a valuable paper (4) on the causes of variation in *Amblystoma tigrinum* and promises proof that certain of these are inherited or at least perpetuated by reason of inheritance. Differences in the amount and character of the food produce remarkable modifications in the structure of the animal. If, as is hinted, variations in the appetite are inherited, we should have an interesting case of indirect transmission of characters. Among the conclusions the author says:

> " Specific characters, in species which vary as *A. tigrinum* varies, are, after all, strongly determined by environing conditions. There is nothing new in this. But the study of this species seems to me to lend it new weight and confirmation. If the broad head and large teeth of the cannibal are acquired characters—and they conform to the definition of such—what are the narrow head and smaller teeth of the customary daphnid-feeder? Are these specific and congenital characters? They are more frequent, more " typical " in the species, but I am forced to conclude that they are so chiefly because daphnids are numerous and constitute a convenient and stimulating food. And the same may be said of nearly all specific characters; so readily are they modified by a changed environment that we must conclude they are, in reality, equally determined even by an unchanged environment. Congenital tendencies in such species are not definitely specific, but only indefinitely specific. In this species, indeed, they are not always even definitely generic."

Mr. Powers naturally points out that many of our catalogued ''species'' are merely ontogenetic and believes that ''the zoologist must soon admit that the final test of many species must lie in the rearing, and that, too, under controlled conditions.'' We may, perhaps, go further and say that this is the test of all species, but that it is not worth while to apply the test in all cases. It is probably true that many of our so-called species are not orthodox species but are the results of reversible physiological changes in the soma. However, they are the species as we have them and it seems a hopeless task to go through the animal kingdom and sort the named forms into "ontogenetic" species and "orthodox" species. We shall probably be forced to recognize that the names we give are merely convenient shorthand descriptions of certain organisms, some of which are extremely stable as to form and coloration, others not so much so. Our problem is, then, to find out as much as we can about the causes which bring about the differences which we note.

A new journal, *Zeitschrift für Induktive Abstammungs- und Vererbungslehre,* has just been started. With Baur, Correns and other authorities as editors, much is to be expected of it.

Frank E. Lutz.

Literature

1. 1907. Bachmetjew, P. Experimentelle Entomologische Studien vom physikalisch-chemischen Standpunkt aus. Zweiter Band. Einfluss der äussern Faktoren auf Insekten. xcvi + 944 pp. with 25 plates. Sophia.
2. 1908. Federley, Harry. Uber den Albinismus bei den Lepidopteren. *Acta Societatis pro Fauna et Flora Fennica,* XXXI, No. 4.
3. 1908. Marchal, P. Comptes rendus Soc. de Biologie, July. LXV, No. 24.
4. 1907. Powers, J. H. Morphological Variation and its Causes in Amblystoma tigrinum. *Studies from the Zoological Laboratory, the University of Nebraska,* No. 71. 77 pages with 9 plates.

EXPERIMENTAL ZOOLOGY

The Influence of the Size of the Egg and Temperature on the Growth of the Frog.[1]—What determines the difference in size of two animals? It is the difference due to greater or less number of cells, or, perhaps, to a difference in the size of their cells? Does the animal grow by adding more new cells, or by increasing the old cells? These are some of the problems which confront the student of the phenomenon of growth in the animal and plant kingdom alike.

The paper, the subject of this review, contains an account of experiments which attempt to throw light upon these problems.

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[1] Einfluss der Eigrösse und der Temperatur auf das Wachsthum und die Grösse des Frosches und dessen Zellen. Von Robert Chambers, *Arch. für Mikroskopische Anatomie und Entwicklungsgeschichte,* Vol. 72, Part 3, pp. 607–661, 1908.